

# SIEMENS

## MAMMOMAT 1000/3000/3000 Nova



Service

## Service Instructions

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## **Tools, meters and appliances required**

### **Steel rope**

- Standard installation tool kit.
- Digital multimeter (Fluke type 8060A, part no. 97 02 101 Y4290 or Fluke type 87, part no. 97 03 976 Y4290).
- Adjustable strap that carries a weight of at least 110 kg.
- Protective goggles.

### **Lifting carriage motor M1**

- Standard installation tool kit.
- Digital multimeter (Fluke type 8060A, part no. 97 02 101 Y4290 or Fluke type 87, part no. 97 03 976 Y4290).

### **X-ray tube**

- Standard installation tool kit.
- Oscilloscope, e.g. TEKTRONIX 314.
- Service PC (e.g. Siemens Nixdorf PCD3-NSX/20 or similar) with connecting cable (PC-Generator), part no. 99 00 440 RE999.
- Clamps.
- Film bag, cassette, X-ray film and coins.
- Centering cross, part no. 96 60 051 RE 999.

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## Removing the steel rope

1. Remove all stand covers.
2. Move the lifting carriage to the uppermost position.
3. Secure the lifting carriage with a strap (see Fig. 1, pos.1).

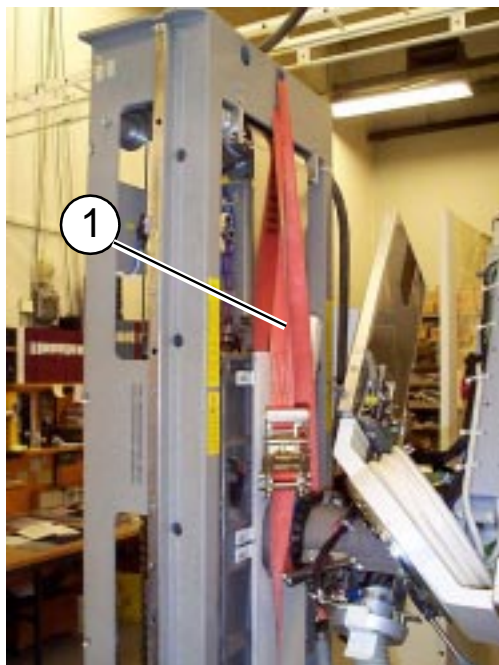


Fig. 1

4. Mark the position of the spring that balances the lifting carriage (balancing spring). Make the mark at the bottom end of the spring.



### **WARNING**

**The edges of the metal curtain of the stand are very sharp and may cause severe injury. Take care when marking the position of the balancing spring.**

5. Release the balancing spring with a ratchet wrench (see Fig. 2, pos.2).

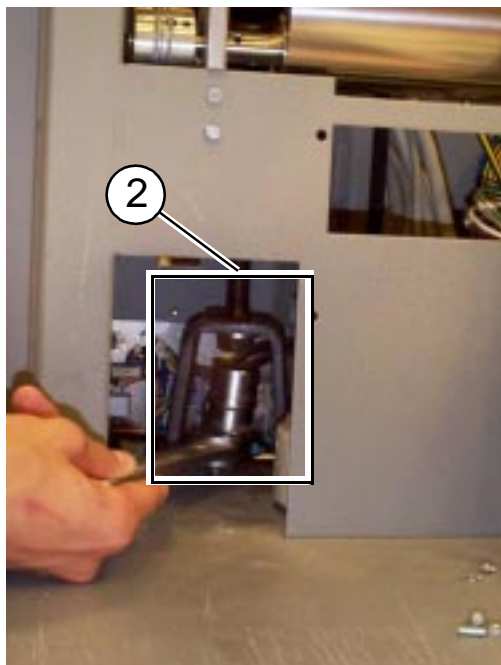


Fig. 2

6. Remove the traction spring (see Fig. 3 and Fig. 4, pos.3).



**WARNING**

**The traction spring is tightly stretched. Protect your eyes when removing it.**

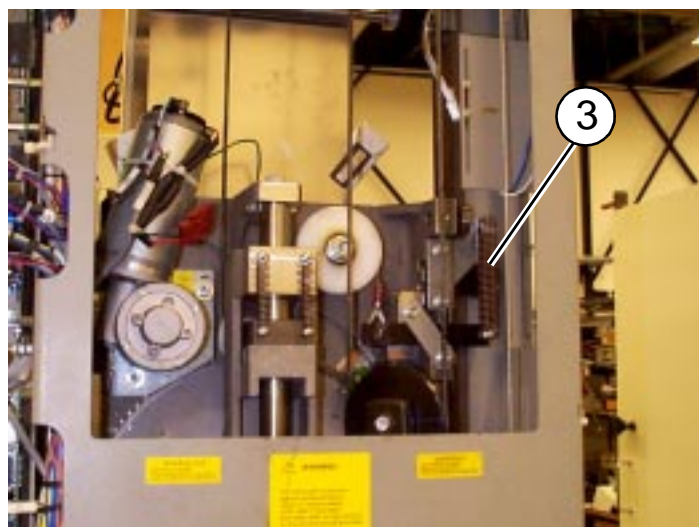


Fig. 3

7. Remove the metal plate (see Fig. 4, pos.4).
8. Carefully remove the safety catch for the lifting carriage (see Fig. 4, pos.5).



9. Remove the clamp ring (see Fig. 4, pos.6).

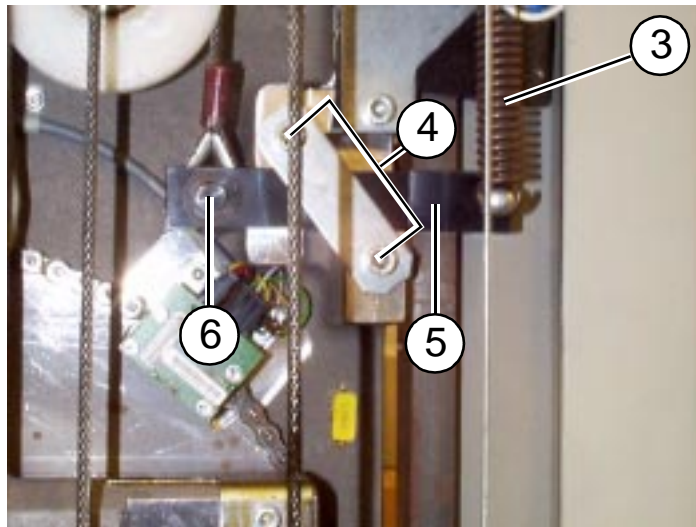


Fig. 4

10. Remove the pin. This frees the eye loop of the steel rope (see Fig. 4, pos.6).  
11. Remove the clamp ring (see Fig. 5, pos.7).

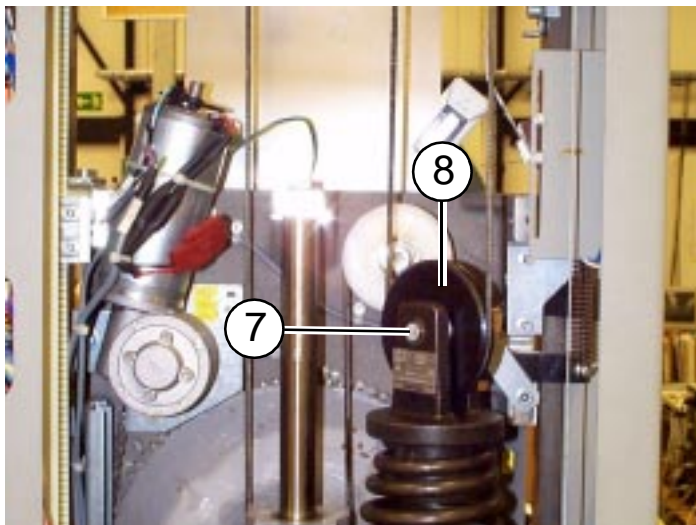


Fig. 5

12. Remove the pin (see Fig. 5, pos.7).  
13. Remove the black cord wheel. The rope is now free (see Fig. 5, pos.8).

14. Remove the screw (see Fig. 6, pos.9).

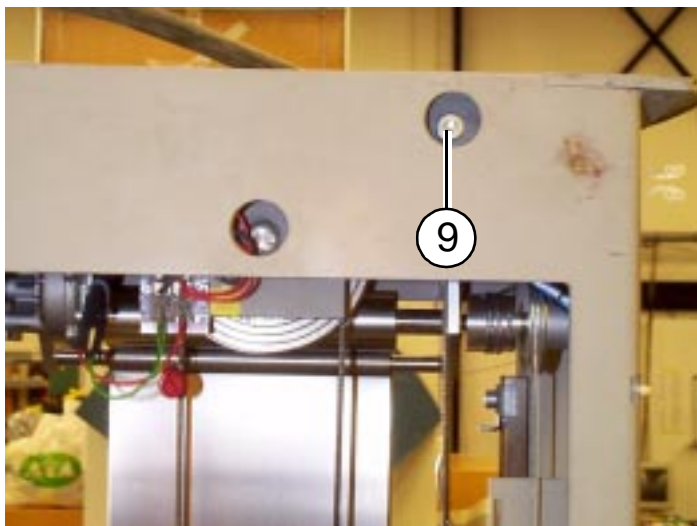


Fig. 6

15. Remove the eye loop (see Fig. 6, pos. 9).
16. Remove the rope from the two white cord wheels.
17. Remove the fastening screw at the step pulley (see Fig. 7, pos.10).

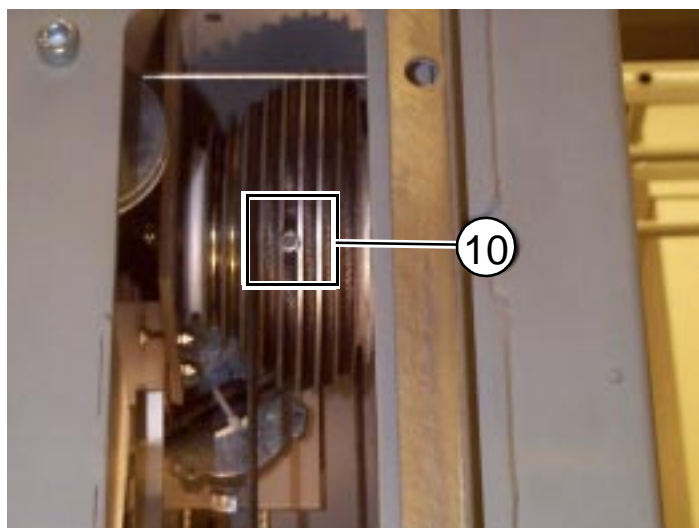


Fig. 7

18. Unwind the steel rope from the step pulley.
19. Remove the rope.

## Installing the new steel rope

1. Wind the steel rope 5.5 times around the step pulley so that the red mark coincides with the position of the fastening screw. Let the red marked end of the steel rope hang down to the left, and the non-marked end hang down to the right.

2. Attach a cable tie to the steel rope (see Fig. 8, pos. 12). This will keep the rope in place while installing it.

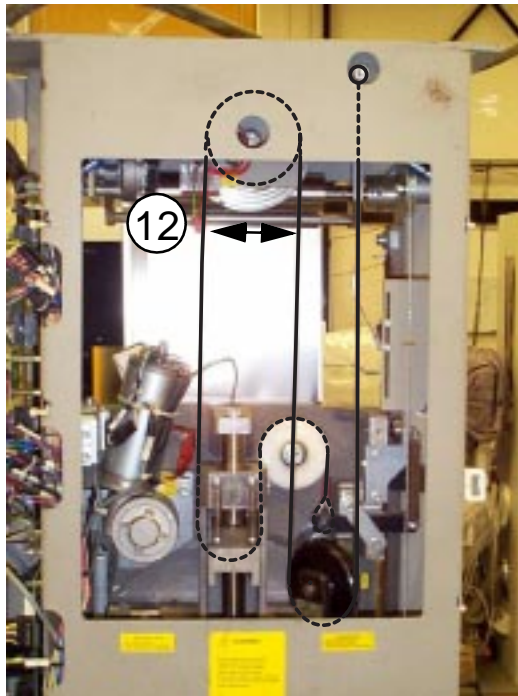


Fig. 8

3. Secure the steel rope to the step pulley with the fastening screw (see Fig. 7, pos.10).
4. Route the red marked end of the steel rope from left to right behind the pole (see Fig. 9, pos.13).

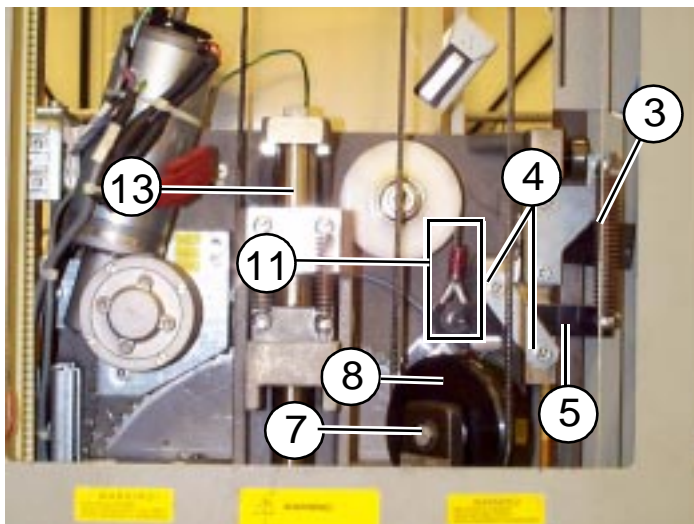


Fig. 9

5. Attach the red marked end of the steel rope to the safety catch (see Fig. 9, pos.11). When doing this, the safety catch is not yet installed on the lifting carriage.
6. Route the free end of the steel rope to the rut on top of the balancing spring.

7. Reinsert the black cord wheel and the pin (see Fig. 9, pos.7 and 8).
8. Secure the free end of the steel rope to the stand (see Fig. 6, pos.9).
9. Route the steel rope to the two white cord wheels.
10. Install the safety catch (see Fig. 9, pos.5).
11. Install the metal plate (see Fig. 9, pos.4).
12. Install the traction spring (see Fig. 9, pos.3).

**WARNING**

**The traction spring has to be tightly stretched. Protect your eyes when installing it.**

13. Check that the rope lies in place on the three cord wheels and in the step pulley.
14. Expand the balancing spring a little so that the steel rope begins to tighten, then remove the cable tie (see Fig. 8, pos.12).
15. Expand the balancing spring down to the mark made earlier.
16. Remove the strap that secures the lifting carriage (see Fig. 1, pos.1).
17. Move the lifting carriage through its full range and check that the rope moves freely.

### Measuring the current draw for upward and downward movement of the lifting carriage

1. Disconnect one of the motor wires from X887 and connect the digital multimeter (see Fig. 9, pos.12).

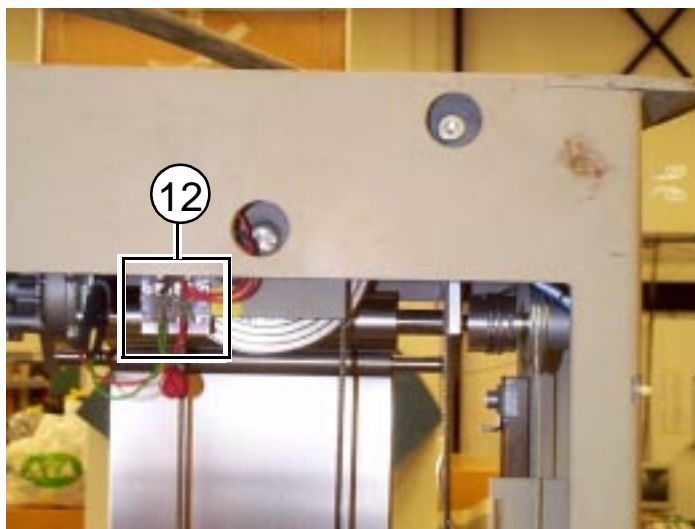


Fig. 10

2. Measure the current draw for upward and downward movement:
  - When measuring, make sure the lifting carriage is near the middle of its range.
  - Maximum value for both directions: 1.5 A DC.

-The difference between upward and downward current must not exceed a maximum of 0.15 A DC, whereby the current for downward movement must be smaller or equal to the current for upward movement.

3. Correct this, if necessary, by expanding or compressing the balancing spring.

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**NOTICE**

On newer MAMMOMATs the tension adjuster of the drive belt is placed on the side of the stand (see Fig. 1, pos.1). Refer to chapters "Replacing the lifting carriage motor M1-I" on Page 3 - 2 and "Replacing the drive belt-I" on Page 3 - 4.

On older MAMMOMATs the tension adjuster of the drive belt is placed inside the MAMMOMAT beside motor M3 (see Fig. 2, pos.2). Refer to chapters "Replacing the lifting carriage motor M1-II" on Page 3 - 3 and "Replacing the drive belt-II" on Page 3 - 5.

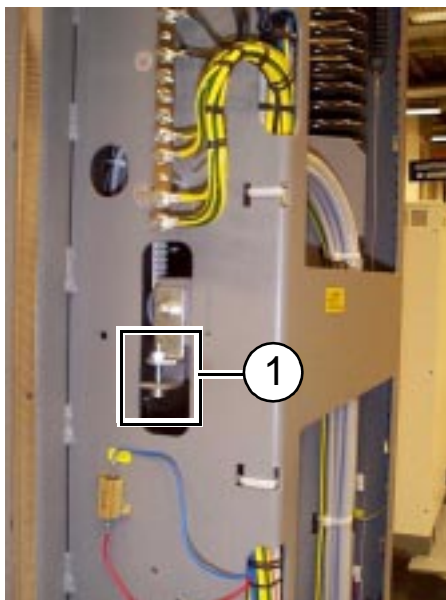


Fig. 1

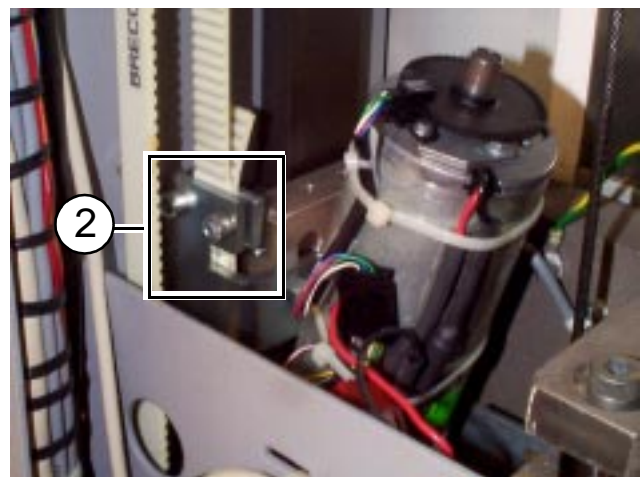


Fig. 2



### Replacing the lifting carriage motor M1-I

1. Remove the side and back wall cover of the stand.
2. Move the lifting carriage to the lowermost position.
3. Secure the lifting carriage with the transport safeguard (see Fig. 3, pos.3).

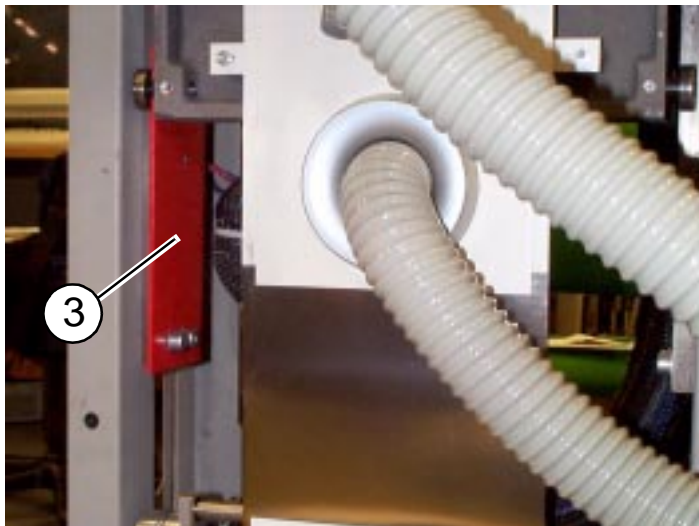


Fig. 3

4. Undo the screws on both sides of the gear. This releases the tension of the drive belt (see Fig. 4, pos.1).

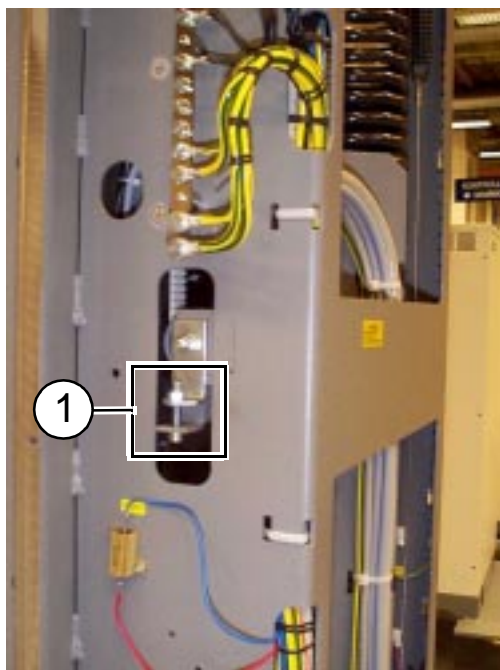


Fig. 4



5. Remove the 3 screws (see Fig. 5, pos.4, 5, 6).

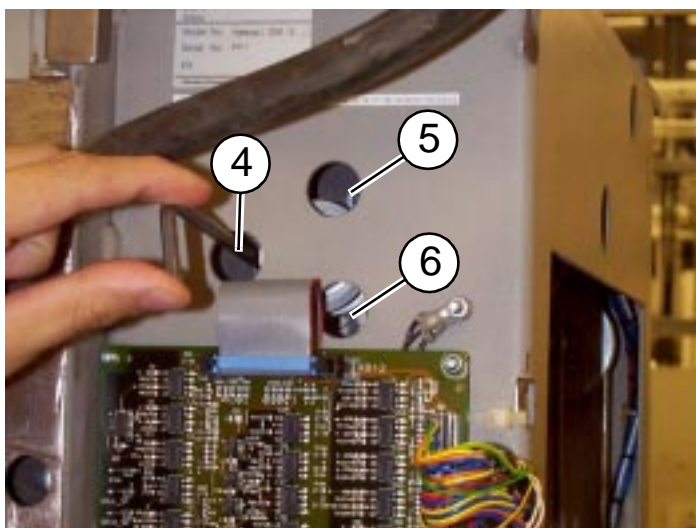


Fig. 5

6. Replace the motor.
7. Secure the new motor with the 3 screws (see Fig. 5, pos. 4, 5 and 6).
8. Tension the drive belt (see Fig. 4, pos.1).
9. Remove the transport safeguard (see Fig. 3, pos.3).
10. Move the lifting carriage to the middle of its range.
11. If necessary, fine adjust the tension of the drive belt (see Fig. 4, pos.1).
12. Measure the current draw of the lifting carriage, see chapter "Measuring the current draw for upward and downward movement of the lifting carriage" on Page 3 - 6.

## Replacing the lifting carriage motor M1-II

1. Remove the side and back wall cover of the stand.
2. Move the lifting carriage to the middle of its range.
3. Remove 2 of the screws (see Fig. 5, pos.4, 5).
4. Remove the 3:d screw (see Fig. 5, pos. 6).



### **WARNING**

**When removing the last screw, the lifting carriage may move up or down a little.**

5. Remove the motor.
6. Install the new motor. Secure it with 1 screw only (see Fig. 5, pos.6).
7. Tension the drive belt by rotating the motor.
8. Secure the motor with the 2 remaining screws (see Fig. 5, pos.4 and 5).
9. Measure the current draw of the lifting carriage, see chapter "Measuring the current draw for upward and downward movement of the lifting carriage" on Page 3 - 6.

### Replacing the drive belt-I

1. Remove the side and back wall cover of the stand.
2. Move the lifting carriage to the lowermost position.
3. Secure the lifting carriage with the transport safeguard (see Fig. 3, pos.3)
4. Undo the screws on both sides of the gear. This releases the tension of the drive belt (see Fig. 4, pos.1).
5. Open the drive belt (see Fig. 6, pos.7).

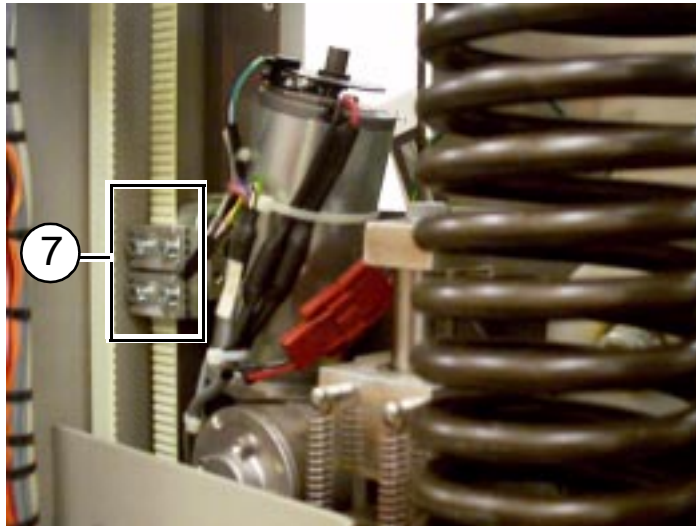


Fig. 6

6. Replace the drive belt.
7. Secure the new drive belt (see Fig. 6, pos.7).
8. Tension the drive belt (see Fig. 4, pos.1).
9. Remove the transport safeguard (see Fig. 3, pos.3).
10. Move the lifting carriage to the middle of its range.
11. If necessary, fine adjust the tension of the drive belt (see Fig. 4, pos.1).
12. Measure the current draw of the lifting carriage, see chapter "Measuring the current draw for upward and downward movement of the lifting carriage" on Page 3 - 6.

## Replacing the drive belt-II

1. Remove the side and back wall cover of the stand.
2. Move the lifting carriage to the middle of its range.
3. Open the drive belt (see Fig. 7, pos.8).



### **WARNING**

**When opening the drive belt, the lifting carriage may move up or down a little. Make sure not to squeeze your fingers.**

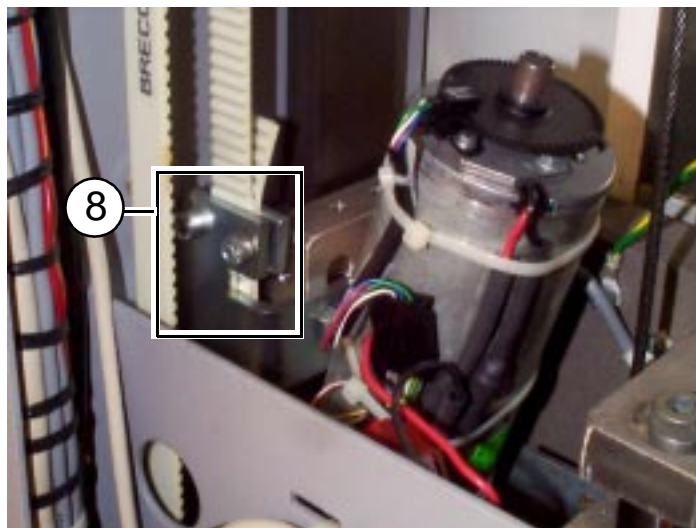


Fig. 7

4. Replace the drive belt.
5. Secure the new drive belt (see Fig. 7, pos.8)
6. Remove 2 of the screws at Motor M1(see Fig. 5, pos.4 and 5).
7. Tension the drive belt by rotating the motor.
8. If necessary, adjust the tension of the drive belt (see Fig. 7, pos.8).
9. Secure the motor with the 2 screws (see Fig. 5, pos.4 and 5).
10. Measure the current draw of the lifting carriage, see chapter "Measuring the current draw for upward and downward movement of the lifting carriage" on Page 3 - 6.

### Measuring the current draw for upward and downward movement of the lifting carriage

1. Disconnect one of the motor wires from X887 and connect the digital multimeter (see Fig. 8, pos.9).

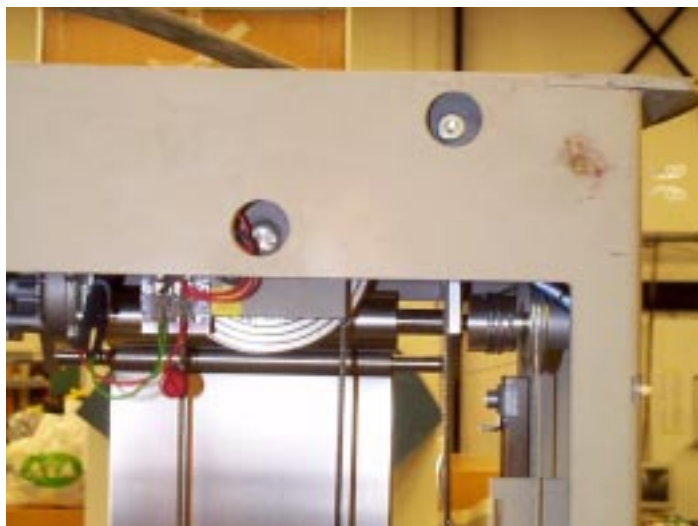


Fig. 8

2. Measure the current draw for upward and downward movement:
  - When measuring, make sure the lifting carriage is near the middle of its range.
  - Maximum value for both directions: 1.5 A DC.
  - The difference between the values for upward and downward current should not exceed a maximum of 0.15 A DC, whereby the current for downward movement must be smaller or equal to the current for upward movement.
3. Correct this value, if necessary, by expanding or compressing the spring that balances the lifting carriage.

## Replacing the X-ray tube

1. Remove the covers of the swivel head.

<b>CAUTION</b>
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The lifting carriage is not counterbalanced after removing the X-ray tube.  
E.G. Use clamps to keep the carriage from moving upward.

2. Disconnect the fan cables (see Fig. 1, pos.1).

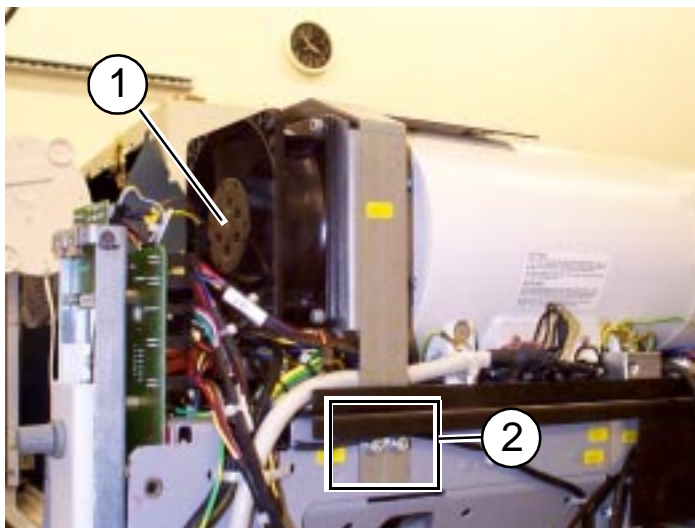


Fig. 1

3. Remove the fan with the bracket (see Fig. 1, pos.2).

<b>NOTICE</b>
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On older MAMMOMATs the screws that hold the bracket are placed on top of the plate.

4. Disconnect plug H11.X1 (monitor switch for front side of X-ray tube). (See Fig. 3, pos.4).
5. Disconnect plug X897 (rotating anode).

6. Disconnect the individual wires of plug X896 (filament). (See Fig. 2, pos.5).

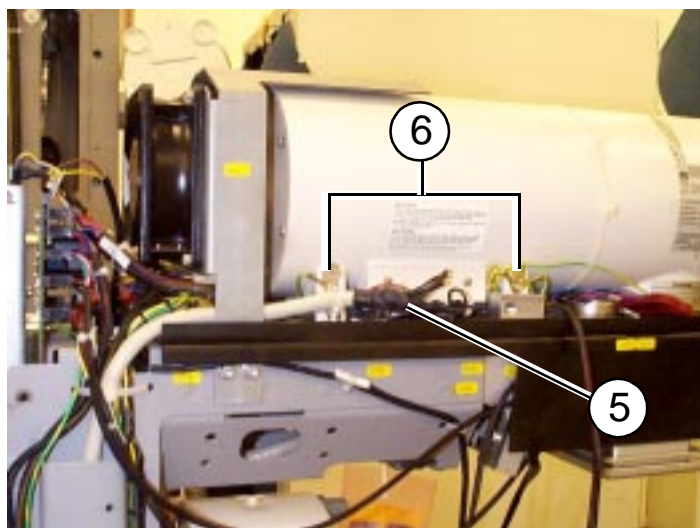


Fig. 2

7. Remove the protective conductor of the X-ray tube.
8. Remove the 4 screws (see Fig. 2, pos.6).
9. Lift up the tube.
10. Remove the high voltage cable (see Fig. 3, pos.7).

**NOTICE**

**On older MAMMOMATs an aluminium container encases the high voltage cable.**

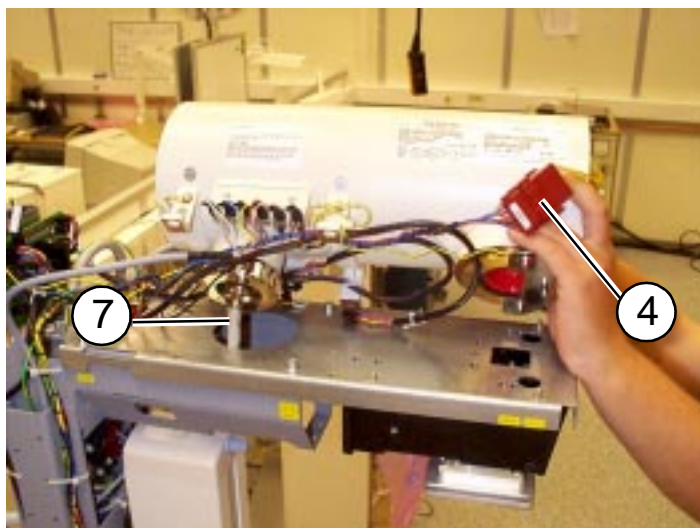


Fig. 3

11. Install the new X-ray tube by reversing the above procedure.

## Starting up the new X-ray tube

1. Connect the service PC. For further information about the service program, see chapter Service Program, (SPB7-230.114.03...).
2. Set the grid voltage for the small focus:
  - Attach the magnification table. This automatically selects the small focus.
  - Connect the voltmeter to the X-ray tube at H3(-) and G(+).
  - Switch the system on.
  - Select the molybdenum anode.
  - Set the grid voltage indicated in the test protocol with R5 on D706.
  - If equipped, select the tungsten anode.
  - Set the grid voltage indicated in the test protocol with R4 on D706.
3. Start the filament learning program.
4. Calibrate the X-ray tube using the "Configuration/ Filament" menu for all applicable foci.
5. Connect the oscilloscope to board D705:
  - Twist all test wires and connect the shielding to "0 VA".
  - Channel 1: MP "Kvist" (kV actual) (1V= 5kV)
  - Channel 2: MP "MAist" (mA actual) (1V= 40mA)
  - Release at MP "KVE" (start with high voltage on).
6. Release exposure, e.g. with 30 kV and 20 mAs, and check the kV and mA.
7. Attach the model labels on the cover of MAMMOMAT 3000.

## Checking the radiation field limitation

To check the radiation field limitation, see chapter "Checking the radiation field limitation" in "Installation and Start-up Instructions", (SPB7-230.033.09...).

## Final procedure

Complete the LINA card and send it to the return address specified.

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